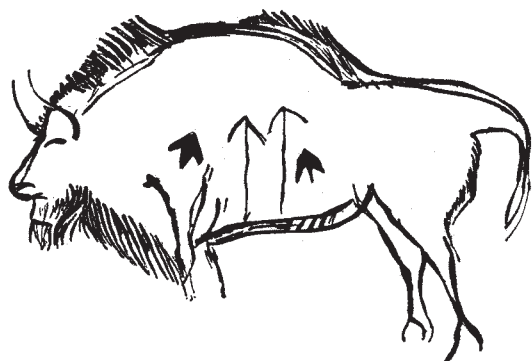


blue clay, this is apparently not the magma in which crystallisation originally took place, for the diamonds may have been forced into the clay by volcanic agencies. Actual blocks of one of the original rocks in which crystallisation took place have been found in blue clay. These blocks consisted of an eclogite containing large quantities of iron, and small diamonds were found, thus suggesting that such was the original mode of formation of the diamond. F. M. P.

PICTOGRAPHS OF ARROWS IN FRENCH CAVES.

THE mural paintings and engravings of the Pyrenean caves is the subject of a series of memoirs by Prof. E. Cartailhac and l'Abbé H. Breuil, now appearing in *l'Anthropologie*. In the current number is an account of the "Grotte des Forges" at Niaux, Ariège. The cave is a narrow gallery more than 1400 m. in length, with several short branches; at 611 m. from the entrance a broad lateral gallery runs due south for a distance of 160 m., and terminates in a rotunda, the walls of which are decorated with bisons, horses, deer, wild goats, and groups of signs. There are no designs of animals in the first half of the main gallery, and only five at long intervals in the second. The authors write with enthusiasm concerning the rotunda. The paintings possess to a supreme



bison in the Salon noir of Niaux transfixed by three arrows.

degree the style of the period, and represent the same animals that were familiar to the Palæolithic artists of the Pyrenees, the bisons being in the great majority. The drawings, which represent animals in profile, are drawn with a brush in black pigment with a sure and exact touch, and the characteristic traits of the animals are conscientiously delineated. The best polychrome frescoes are to be seen in the caves at Altamira, in Spain, but Niaux is unexcelled in its fine work. The black pigment consisted of a mixture of charcoal and oxide of manganese worked up with grease.

Perhaps the most important new feature of the Niaux pictographs is the representation of arrows sticking into many of the animals, thus conclusively proving the existence of the bow and arrow at this early period. The accompanying figure represents a large bison with four arrows, the two lateral being red in colour. Some of the animals are marked by a spot, which may be intended to represent a wound.

A lamp placed on the ground in a corner of the rotunda or "salon noir" revealed, by chance, a series of engravings on the firm clay soil of the cave. The same animals that were painted on the walls were also engraved on the ground. The drawings were of the same style, and some of the animals were pierced with arrows. But it was only on the ground that

designs of fish occurred, one of which, 30 cm. in length, is readily recognised as a trout. Even some impressions of the naked feet of the artists were still visible. Of definite objects very little has as yet been discovered, only one small flint scraper of characteristic Palæolithic type, and fragments of bones, pieces of yellow ochre, and ashes. To execute the painting the Cave-men must have had artificial light of some sort.

The sign-pictographs are obscure in their significance. Some look like feathers with long quills; possibly they are arrows, in which case the arrows were feathered. There are several straight or slightly curved broad lines, from near the end of which a prominence is depicted; these appear to represent stone implements let into a thick stick. Other sticks or clubs are straight or slightly curved; these the authors regard as boomerangs. Other markings consist of lines or groups of spots, some of a red colour arranged in a circle surrounding a central spot. These recall the markings on the coloured pebbles of the famous cave of Mas d'Azil.

These discoveries by our French colleagues are shedding welcome light upon the life of the Palæolithic cave-dwellers of western Europe, but doubtless more information will come to hand when the investigation of the wonderful French caves is completed.

A. C. H.

NOTES.

SIR GEORGE DARWIN, K.C.B., F.R.S., has been elected a foreign member of the Amsterdam Academy of Sciences.

THE "Società italiana delle Scienze (detta dei XL)," of which Prof. Cannizzaro is president, has elected Sir William Ramsay as a foreign fellow (Socio straniero).

THE annual conversazione of the Royal Society of Arts will be held at the Natural History Museum, South Kensington, on Thursday next, July 2.

WE learn from the *British Medical Journal* that Prof. Grassi, whose name is well known in the scientific world in connection with research on malaria and other subjects, has been created a Senator of the kingdom of Italy.

THE annual meeting of the Victoria Institute will be held at Burlington House on Wednesday, July 15. The chair will be taken by the president, the Earl of Halsbury, F.R.S., and an address will be given by Mr. E. Walter Maunder.

THE council of the Royal Society has awarded the Mackinnon studentships for the year 1908 as follows:—one in physics to Mr. J. A. Crowther, of St. John's College, Cambridge, for an investigation of the passage through matter of the β rays from radio-active substances; one in biology to Mr. D. Thoday, of Trinity College, Cambridge, for a research into the physiological condition of starvation in plants and its relation to the responsiveness of protoplasm to stimulation, especially to stimuli affecting respiration.

MR. A. G. BAGSHAW, the director of the Sleeping Sickness Bureau, who can be addressed care of the Royal Society, Burlington House, London, W., desires it to be known that he will be glad to receive reprints of any papers dealing with sleeping sickness, trypanosomiasis, and cognate subjects, and, indeed, any information relating to the work of the bureau.

REUTER'S Agency learns that a fresh commission is being organised to proceed to East Africa to study sleeping sickness, its object being to continue the work carried

on from 1902 until it was temporarily suspended in 1905, owing to the death in England of Lieut. Tulloch, who contracted sleeping sickness during his researches in Uganda. The new commission will be in charge of Colonel David Bruce, C.B., F.R.S., and, on September 25, will proceed from England, *via* Mombasa, to Lake Victoria, on the northern shores of which the Uganda Protectorate is preparing a laboratory in the province of Chagwe, two miles from the lake, for the purposes of the investigation. The spot chosen will be within five or six miles of one of the concentration camps organised by the Government, where sleeping sickness patients are under treatment. The work of research will include the study of the natural history of the fly, and also of Dr. Koch's theory that crocodiles provide foodstuffs for the *Glossina palpalis*. The commission will also investigate the question whether the lower animals harbour the parasites, and the exact method by which the fly transfers the parasite.

We regret to announce that Prof. W. R. Cassie, professor of physics at the Royal Holloway College for Women, Egham, and honorary secretary of the Physical Society, died suddenly on June 22. Prof. Cassie, who was born at Fraserburgh in 1861, was educated at Aberdeen University and Trinity College, Cambridge. He was Clerk-Maxwell student of experimental physics at the Cavendish Laboratory from 1891-3; a Cambridge University extension lecturer from 1888-93; Thompson lecturer on natural science, Free Church College, Aberdeen, 1893-4; and in 1893 was appointed to the chair of physics occupied by him at the time of his death.

MR. GEORGE SIM, author of "The Vertebrate Fauna of Dee," died at Aberdeen on June 15 at the age of seventy-three. He was a fine type of the self-trained naturalist, and made many interesting contributions to faunistic zoology. His knowledge of British birds, fishes, and crustaceans was very wide and accurate, and he was remarkably disinterested and generous in placing both specimens and information at the disposal of serious workers. He pursued several lines of inquiry into great detail, having, for instance, a quite extraordinary knowledge of the specific characters of fish-scales. He gave some of his collections to the University of Aberdeen.

THE committee of the Lawes Agricultural Trust held its annual meeting for the inspection of the Rothamsted Experimental Station on June 19. A vote of condolence was addressed to Lady Evans expressing the sympathy of the committee in the loss she had sustained through the death of Sir John Evans, who had been chairman of the committee since the foundation of the trust, and to whose endeavours the organisation and extension of its work had been so largely due. In the afternoon the laboratory and field experiments were inspected.

THE council of the Royal College of Surgeons has given permission to Dr. Elliot Smith and Dr. Wood Jones, of the Cairo Medical School, to carry out, in the museum of the college, an examination of a collection of material found during excavations in the Nile Valley. The material is representative of peoples inhabiting Nubia in ancient times, and is expected to throw light on their pathology and the results of their surgery. The Egyptian Government has expressed its willingness to present the collection of specimens to the museum of the Royal College of Surgeons, and the council has accepted the offer.

QUEEN'S UNIVERSITY, Ontario, has received as a gift from Dr. J. P. Thomson, hon. secretary and treasurer of the Royal Geographical Society of Australasia, Brisbane,

a large and valuable collection of specimens for its museum. The collection, which is typical and widely representative, consists of no fewer than 457 ethnological specimens and 140 shells of different kinds from Polynesia, New Guinea, and Australia, many of the specimens being very rare. Dr. Thomson is also sending to the University a large collection of economic minerals, a great number of additional ethnological specimens, some rare birds' skins from New Guinea, and many Queensland butterflies and moths. The thanks of the University have been conveyed to Dr. Thomson, whose valuable gifts are deeply appreciated.

THE Society of Mineral Industry, the most important mining and metallurgical institution in France, celebrated at St. Etienne on June 14-20 its jubilee by a very successful congress, which was attended by 436 engineers from the various mining and metallurgical districts of France. Mr. L. Tauzin, inspector-general of mines, presided; and papers were read by Messrs. Siegler, Vicaire, Bureau, Marsaut, Laur, Fayol, Rateau, de Ren ville, and Lemierre. Visits were paid to the principal collieries and steelworks in the district. At the banquet on June 17 gold medals were presented to Messrs. Marsaut, Rateau, Fayol, Pourcel, and other distinguished members of the society who had done most for mining and metallurgy during the past fifty years, and congratulatory addresses were presented by Mr. Bennett H. Brough on behalf of the Iron and Steel Institute, and by Mr. Hedley on behalf of the North of England Institute of Mining Engineers.

At the annual general meeting of the Linnean Society of New South Wales, held in March last, Mr. A. H. S. Lucas delivered his presidential address, taking as his special subject the relations of science and government. Having advanced to his present position in the provinces of nature, man must, he said, fortify the position he has won, and must advance by utilising the knowledge which workers in science alone can provide. This essential fact, he maintained, is not sufficiently recognised by the public or by politicians. The appreciation by Australia of the modern point of view is, he urged, of great importance, because she has begun to learn through the pocket the costliness of ignorance. The Government alone can watch over the permanent interests of the State and see that resources are not impoverished. The scientific method, the method of accurately informed common sense, is the only efficient method in government as in everything else. Science is the natural ally of government. In regard to material questions, the man of science of the twentieth century occupies the position of the prophets of old. Without science no nation can keep its place in the van, for "science is the golden guiding star of practice; without science there can only be a blind groping in the region of undefined possibilities."

We have to acknowledge the receipt of three papers issued by the University of California, the first of which, by Mr. J. C. Bradley, is devoted to two species of amphipod crustaceans of the genus *Corophium* from the Pacific coast. The other two, by Mr. C. A. Kofoed, deal with the pelagic unicellular organism *Ceratium*, more especially from the point of view of exuviation and regeneration.

ACCORDING to the "Aarsberetning" for 1907, the authorities of the Bergen Museum are devoting special attention to the exhibition series, which is being developed much on the lines of our own Natural History Museum. Several of these new exhibits are illustrated by reproductions from photographs, and among them, judging from these illustrations, may be specially commended a pair of

bar-tailed godwits with their young, and the head of a porqual.

THE history of the Hancock Museum at Newcastle-on-Tyne forms the subject of an article by the curator, issued as an appendix to the Transactions of the well-known northern natural history society. A feature of this institution is that it is owned and maintained by the society, and therefore costs nothing to the ratepayers. The maintenance of such a large institution naturally imposes a heavy burden on the society, the efforts of which in other directions are in consequence somewhat crippled. On the other hand, the society enjoys the advantage of complete and unfettered control of a number of valuable collections which have from time to time been consigned to its custody. The article is illustrated with two views of the museum, together with portraits of Joshua Alder, Albany and John Hancock, and Thomas Atthey.

WE have been favoured with a copy of the first number of the Annals of the Transvaal Museum, at Pretoria, which contains an illustrated account of the origin, progress, and present condition of that institution, together with several papers on the zoology and botany of the Transvaal. The fauna of South Africa is illustrated in a series of saloons specially devoted to that purpose, while other saloons contain the mammals, birds, fishes, &c., of other parts of Africa and the world generally. So far as can be gleaned from the photographs, many of the larger mammals appear to be well mounted, and it is satisfactory to learn that the collection includes a fine example of the white rhinoceros. The museum was founded in 1892, on the initiative of Dr. W. J. Leyds, and since that date appears to have made remarkable progress, although its development is hindered by lack of sufficient funds and space.

IN the course of his presidential address to the South London Entomological and Natural History Society, as reported in the Proceedings of that body for 1907-8, Mr. Robert Adkin directed attention to the advantage accruing from federation among local scientific bodies. The Yorkshire Naturalists' Union set the example of such federation so long ago as 1862, with the result that while numerous advantages were found to follow, no harm was done to the local work of the various bodies which constitute the union. In 1896, at the invitation of the Tunbridge Wells society, the South-eastern Union of Scientific Societies was established, as the result of which it has been found practicable to hold an annual congress at one of the towns within the area covered by the union, to the great advantage of the members. Nor was this all, for in the shape of the *South-Eastern Naturalist* the union publishes a journal which deservedly occupies a high position among literature of this class. The success of this southern federation is indicated by a proposal that the local societies of Essex and Hertfordshire should be eligible for admission to the union.

THE eighth part of vol. iv. of the Annals of the South African Museum contains no less than five papers by Dr. R. Broom on the Permo-Triassic tetrapodous vertebrates of the country. In the first the genus *Propappus*, originally named from a single limb bone, is stated to be distinct from *Pariasaurus*, having, among other peculiarities, a dermal armour on the spinal region. New generic types of the carnivorous groups are also described, and it is pointed out that the difference in the structure of the palate between the Permian and the Triassic representatives of these reptiles amply justifies their separation into distinct

groups. While the latter, as typified by *Galesaurus*, have a typically mammalian secondary palate, that region in the former is a modification of the type obtaining in rhynchocephalian reptiles. For these two groups Dr. Broom employs the names *Cynodontia* (= *Theriodontia*) and *Therocephalia*. In the last of the series the author assigns certain Cape labyrinthodonts (one of which had been referred to the American *Eryops*) to the new genus *Rhinesuchus*, of which, however, the type is a German species.

MR. T. SHEPPARD, curator of the Hull Museum, has issued another of his useful penny booklets, in which he discusses prehistoric remains from Lincolnshire, and fish and other remains from the Chalk of Lincolnshire and Yorkshire. These relics are mostly of the Bronze age; a few are Neolithic, but Palæolithic man is apparently not represented in this part of the country. They include some fine cinerary urns and an "incense cup" from a tumulus at Kirton Lindsey; and some stone implements, such as a perforated adze axe-hammer, from the Drift. One remarkable perforated adze is suspected to be the handicraft of the notorious Flint Jack. From Burton-on-Humber come a fine bronze palstave and two imperfect axes, probably rejected failures from a founder's horde. The fossils include those of ganoid and teleostean fishes, as well as selachians from the well-known chalk quarries at Barton and South Ferriby. Mr. Sheppard's careful examination of these relics, of which his pamphlet contains good illustrations, supplies an excellent example of the class of work which a local museum under competent management can usefully prosecute.

DR. R. SEMON contributes to the *Biologisches Centralblatt* (April 1) an article on the effects induced in plants by alternations of light and darkness, and the question originally investigated by him whether these effects are transmitted to plants of a subsequent generation. He directs particular attention to the facts that he experimented with seedlings of *Albizia lophantha*, and used a very weak stimulus.

ATTENTION is directed in the report for 1906-7 on the botanical and agricultural establishments of Antigua to the advantages derived by the presidency from the working of the Imperial Department of Agriculture for the West Indies. In addition to the re-establishment of an efficient botanic station and a revival of the decadent sugar industry, the Department has fostered agricultural education and has developed an appreciable cotton trade. In connection with sugar, it is noteworthy that two central factories are in operation. Reference is made in the report to the celebration of arbor day, when two hundred trees, largely mahogany, were planted. It is noted that for hedges *Malpighia glabra* and logwood, *Haematoxylon campechianum*, have been found useful.

It will probably be unknown, even to some bamboo fanciers, that certain bamboos in Japan have a special value because they are flecked or coloured. Where the effect is a natural one, it is generally due to lines or stripes of a colour differing from the general ground colour; in other cases the figuring is produced by fungi. Instances of the latter are furnished by a Chinese undetermined species of *Phyllostachys* and the Japanese plant, *Arundinaria Narahira*. An account of the latter and the parasitic fungus *Miyoshia fusipora* is contributed by Mr. S. Kawamura to the Journal (vol. xxiii., art. 2) of the Royal College of Science in Tokio. Artificial sowings on the bamboos were not very successful, but conidia, perithecia,

and ascospores were obtained in cultures, as a result of which the fungus is made the type of a new genus, allied to *Trichosphaeria*, of the order *Sphaeriaceæ*. The bamboos are converted into walking-sticks, flutes, and small articles.

IN connection with an article on the "Pigmentation Survey of Scotland," which appeared in *NATURE* of May 21 (p. 68), Mr. J. F. Tocher requests us to state that the survey, which was carried out under the supervision of a committee consisting of Sir W. Turner, Prof. R. W. Reid, Mr. J. Gray, and himself, has up to the present extended only to school children—one-eighth of the total population; that his share in Mr. Gray's report, published in the *Journal of the Royal Anthropological Institute*, and noticed in *NATURE*, was confined to supplying a key map and some statistical tables; that he is not responsible for the views expressed in Mr. Gray's article; and that a complete account of the results, with the conclusions which he has drawn from them, is in the press, and will be published at an early date.

THE methods of manufacture of the remarkable Malaita shell bead money current in the Solomon group are described by Mr. C. M. Woodford in the June number of *Man*. Of this there are three varieties:—white, made from the shell of *Arca granosa*; red, from that of *Chama pacifica*; black, from a large black mussel or pinna. The shells are first broken into irregular fragments about the size of a threepenny piece. They are next chipped into the form of a roughly circular disc, in diameter about as large as a pea. Finally, these are ground into shape on a stone, the fragments being fixed on the flat surface of a piece of soft wood of semicircular section. This stone is so rare and valuable that Mr. Woodford was able to secure only a few pieces. After being pierced by means of a pump drill, the beads are threaded on strings, each a fathom or about 5 feet long, the character and colour of the beads determining their values as currency.

AN admirably illustrated description of the Federal Fuel Testing Laboratory at Zurich is given by Prof. E. J. Constan in the *Engineer* (vol. cv., p. 618). The laboratory was started in 1906, and has already done much to ensure that Switzerland receives the proper equivalent for the 3,000,000l. annually expended on imported fuel. In the first year of its existence, besides research work, more than 3300 samples of coal and briquettes were examined. Most came from Germany, and the rest from Belgium, France, and England. This extensive examination of imported fuels has tended to enlighten the consumers as to the qualities and economic value of the fuels from the various countries and collieries, and has contributed towards their classification according to heating power. It is to be hoped that before long this latter will be universally adopted for the basis of coal contracts, instead of the vaguely defined evaporation power, or the percentage of combustible matter.

FROM the Pulsometer Engineering Co., Ltd., we have received a catalogue of pulsometers which, in that it contains a detailed description of the working and of the various applications of this useful form of steam pump, is of greater interest than the usual type of manufacturers' price-list. The pulsometer will pump dirty water, it has no moving parts except the valves, it disposes of its own exhaust steam, it can be supported on its suction pipe or slung from a chain. In short, it is essentially a pump that will stand rough usage, and requires no skilled attention. In these circumstances the useful services it is cap-

able of rendering are evident, and the variety of applications of the pulsometer are well shown in the excellent illustrations given in the catalogue.

WE are indebted to Prof. G. Platania for an interesting pamphlet (reprinted from the *Annuario* of the R. Nautical Institute of Catania, 1908) on the determination of wind direction and force at sea, and on the Beaufort scale. The author quotes the results of various comparisons of wind-force estimated by the latter method with the records of anemometers both in this country and abroad, and especially the recent elaborate discussion by Dr. Shaw and Dr. Simpson (Meteorological Office Publication, No. 180, 1906). The author also quotes a useful modification of the scale, suggested by Commander Hepworth, in view of the changed conditions due to the use of steam and to the rig of modern sailing vessels since it was devised by Sir F. Beaufort in 1806. Prof. L. Marini proposed an elegant method of finding the true direction and velocity of the wind from the speed of the ship and the direction of the apparent wind, without reference to its velocity (*Rivista Geogr. Ital.*, 1907), which, although worthy of being known, is not very easy of practical application. Prof. L. Rotch's ingenious instrument, made by Casella, of London (*Quart. Journ. R. Meteor. Soc.*, 1904), is admitted to be more useful in practice.

THE values which have been obtained for the molecular weight of the radium emanation have been based on observations of the rates of diffusion of the emanation and of various gases in the same circumstances. According to Graham's law, the molecular weights should be inversely proportional to the squares of the rates of diffusion, but the values of the molecular weight of the emanation calculated on the assumption of the truth of this law have differed widely from each other. Rutherford and Brooks obtained a number between 44 and 74, while Bumstead and Wheeler more recently found a value about 180. Mr. P. B. Perkins, of Yale, has just completed a comparison of the rates of diffusion of the emanation and of mercury vapour through a porous plug, and publishes his results in the June number of the *American Journal of Science*. He concludes that the molecular weight of the emanation exceeds that of mercury, and probably differs little from that of radium, 227.

ALTHOUGH much has been written on the theory of the Ruhmkorff coil, the simpler single circuit induction coil, so much used in these days to ignite the explosive mixture in gas and petrol engines, has received little attention, and no accurate measurements of its efficiency have been made. The *Physical Review* for May contains an article on the subject which is probably the first ever published. It is from the pen of Mr. B. F. Bailey, and includes both a theoretical treatment and a comparison of theory with experiment. In the case of one of the coils tested the efficiency, that is, the ratio of the energy of the spark to that supplied to the coil, was 54 per cent., while the calculated value was 56 per cent., and the author shows how, by cutting down the time of contact, the efficiency of the coil was raised to 85 per cent.

THE Philosophical Institute of Canterbury is one of the district institutes affiliated to the New Zealand Institute, and is devoted, among other works, to the encouragement of science. It was founded in 1862, and though undergoing many vicissitudes since that date, it has had a continuous existence, and has numbered among its members most of the residents of Canterbury interested in science. The institute holds regular monthly meetings from May to

December, and a syllabus for the present year has been received. Among subjects to be dealt with this session we notice Mendel's law of heredity, physical and geological problems suggested by the construction of the Arthur's Pass Tunnel, bird life in New Zealand, and Antarctic exploration. The council of the institute has in hand the publication of reports that will be made on the collections secured during the recent sub-Antarctic expedition to the Auckland and Campbell Islands, and has taken steps to secure the proper investigation of scientific questions which will be raised by the boring of the Arthur's Pass Tunnel. Mr. E. G. Hogg, of Christ's College, is the president of the institute; Mr. R. Speight, of Canterbury College, the honorary secretary; and Dr. Chas. Chilton, of Canterbury College, the honorary treasurer.

THE issue of *Science* for June 5 contains an interesting symposium at the Illinois State Academy of Science on the opportunities for American young men in science. Prof. J. G. Coulter deals with the opportunities available in botany, Prof. W. A. Noyes with openings for chemists, Dr. H. Foster Bain with the outlook in geology, Prof. H. Crew that in physics, and Dr. H. V. Neal that in zoology. There is a fair unanimity among the contributors that the young man whose primary object is to make money should not select as his life's work the pursuit of pure science. It is curious to remark that Prof. Coulter referred to the lack of interest in science on the part of the American public, and traced it to the same cause as was suggested in the *Times* correspondence arising out of the speeches at last year's Royal Society dinner to account for the similar apathy in this country, that American men of science rarely make it their duty properly to popularise the problems on which they are at work. Prof. Coulter stated that in America the demand for trained botanists continues to exceed the supply. Prof. Noyes estimated that there are about 8000 chemists in the United States, and concluded by saying that the demand for chemists to fill positions in connection with the bureau of chemistry has largely exceeded the supply of suitable men. Dr. Bain made it clear that it may be taken for granted that properly equipped and willing workers in geology may rest assured of positions being open to them. Prof. Crew summarised the opportunities for young men in physics under the headings of research, applied physics, engineering, and teaching, and spoke very hopefully of the outlook in each of these directions. Dr. Neal said, so far as zoology is concerned, that the chances for getting good zoological positions have much improved during the last ten years. Though there is this increased demand, there has been no increase in the supply of men to fill the posts. New fields for employment are being opened, and there is every possibility that the present demand for zoologists will be maintained.

PROF. E. B. POULTON'S "Essays on Evolution" are to be published by the Oxford University Press on July 1, the fiftieth anniversary of the meeting of the Linnean Society at which was read the joint essay on natural selection by Darwin and Wallace. The ten essays cover the period 1889-1907.

MESSRS. E. AND F. N. SPON, LTD., have published, at 4d. net, tables of logarithms, antilogarithms, useful constants and the functions of angles, taken from the examination tables of the Board of Education. The tables are mounted on linen, and so folded that they will go into the pocket easily; they can be opened out in such a way that the logarithms and antilogarithms can be examined side by side.

THE first part of the "International Geography" by seventy authors, edited by Dr. H. R. Mill, has now been published separately by Messrs. Macmillan and Co., Ltd., at 1s. 6d. This section, which deals with the principles of geography, is the eighth portion of this standard book to be issued in a convenient separate form, and at a price which makes it available as a class-book in schools. These parts of the "International Geography" deserve to be widely used in schools where the study of geography is taken seriously.

WE have on previous occasions directed attention to the medical and scientific circulating library conducted by Mr. H. K. Lewis, of Gower Street, London, W.C. The new edition of the library catalogue, revised to the end of 1907, has been published recently at a price of 2s. net to subscribers and 5s. net to non-subscribers. The catalogue shows that the student and man of science may here obtain the advantage of a very large collection of modern medical and scientific text-books and special monographs. In addition to books on pure and medical science, works on different branches of engineering science and general technology are included. Not only are the books classified under their authors' names, but they are also conveniently arranged in a second section according to subjects.

OUR ASTRONOMICAL COLUMN.

THE RINGS OF SATURN.—In a note published as Bulletin No. 32 of the Lowell Observatory, Prof. Lowell develops rather more fully the idea that the appendages B and C of Saturn are not flat rings, but *tores*. He arrives at this conclusion, by two independent methods, from a discussion of the phenomena observed at Arizona during November and December last. In the first place, a black core was observed running medially through the length of the shadowy band which then encircled the planet. This core was seen by all the observers at Flagstaff, although not caught by Prof. Barnard at Yerkes nor reported in the Lick observations, and is presumed to be the black shadow of the plane ring A bordered by the particles of the rings B and C scattered above and below the plane of A. That is to say, the rings B and C differ from A in being *tores* and not flat rings. Then the agglomerations, seen at many different observatories, are shown to be better accounted for by Prof. Lowell's theory of the form of the rings than by the several other theories which have been proposed. An analytical discussion of the perturbing effects to which the ring matter is subjected by the satellites, &c., shows that the assumed heaping up of the particles, as indicated by the agglomerations, is in accordance with gravitational laws. Furthermore, it is shown from the observational results that the inevitable disintegration of the rings is in the process of taking place.

THE FORTY-INCH OBJECTIVE OF THE YERKES OBSERVATORY.—An interesting paper by Mr. Philip Fox, giving the results of an investigation of the 40-inch objective of the Yerkes Observatory, appears in the May number of the *Astrophysical Journal* (vol. xxvii., No. 4, p. 237). The tests, in the first instance, were carried out at the suggestion of Prof. Hartmann, who is desirous that the data might be published for every objective in active use, but they have been extended and comprehensively discussed by Mr. Fox. The method employed was that of the "zonal test," using a perforated diaphragm having sixty holes, each of 2 cm. diameter, located at the corners of squares on fifteen different zones. Briefly, the results indicate, *inter alia*, that the centre of the Yerkes objective is of appreciably shorter focal length than the edge. The variations come, however, well within the limits for which Prof. Hartmann classifies an objective as "preeminently good." Plates taken at varying zenith distances appear to indicate that the performance of the objective varies with the zenith distance, and, should this be confirmed, it appears certain